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DELAWARE RESERVOIR, DELAWARE COUNTY, OHIO

Pacific Northwest Environmental Research Laboratory

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16. ABSTRACT

Annual total phosphorus and total nitrogen loadings to the lake were estimated and subdivided according to either point or non-point source origin. An assessment of the lake's trophic condition and limiting nutrient is also provided. All data collected by the U.S.E.P.A. National Eutrophication Survey during the one year study of the lake and its tributaries are included in the report.

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NATIONAL EUTROPHICATION SURVEY

WORKING PAPER SERIES

REPORT

ON

DELAWARE RESERVOIR

DELAWARE COUNTY

OHIO

EPA REGION V

WORKING PAPER No. 399

PACIFIC NORTHWEST ENVIRONMENTAL RESEARCH LABORATORY

An Associate Laboratory of the

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REPORT
ON
DELAWARE RESERVOIR
DELAWARE COUNTY
OHIO
EPA REGION V
WORKING PAPER No. 399

WITH THE COOPERATION OF THE
OHIO ENVIRONMENTAL PROTECTION AGENCY
AND THE
OHIO NATIONAL GUARD
JUNE, 1975

1a

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FOREWORD

The National Eutrophication Survey was initiated in 1972 in response to an Administration commitment to investigate the nationwide threat of accelerated eutrophication to fresh water lakes and reservoirs.

OBJECTIVES

The Survey was designed to develop, in conjunction with state environmental agencies, information on nutrient sources, concentrations, and impact on selected freshwater lakes as a basis for formulating comprehensive and coordinated national, regional, and state management practices relating to point-source discharge reduction and non-point source pollution abatement in lake watersheds.

ANALYTIC APPROACH

The mathematical and statistical procedures selected for the Survey's eutrophication analysis are based on related concepts that:

a. A generalized representation or model relating sources, concentrations, and impacts can be constructed.

b. By applying measurements of relevant parameters associated with lake degradation, the generalized model can be transformed into an operational representation of a lake, its drainage basin, and related nutrients.

c. With such a transformation, an assessment of the potential for eutrophication control can be made.

LAKE ANALYSIS

In this report, the first stage of evaluation of lake and watershed data collected from the study lake and its drainage basin is documented. The report is formatted to provide state environmental agencies with specific information for basin planning [§303(e)], water quality criteria/standards review [§303(c)], clean lakes [§314(a,b)], and water quality monitoring [§106 and §305(b)] activities mandated by the Federal Water Pollution Control Act Amendments of 1972.

Beyond the single lake analysis, broader based correlations between nutrient concentrations (and loading) and trophic condition are being made to advance the rationale and data base for refinement of nutrient water quality criteria for the Nation's fresh water lakes. Likewise, multivariate evaluations for the relationships between land use, nutrient export, and trophic condition, by lake class or use, are being developed to assist in the formulation of planning guidelines and policies by EPA and to augment plans implementation by the states.

ACKNOWLEDGMENT

The staff of the National Eutrophication Survey (Office of Research & Development, U. S. Environmental Protection Agency) expresses sincere appreciation to the Ohio Environmental Protection Agency for professional involvement, to the Ohio National Guard for conducting the tributary sampling phase of the Survey, and to those Ohio wastewater treatment plant operators who provided effluent samples and flow data.

Ned Williams, Director, and Tom Birch, Ken Carr, Larry Dietrick, Ron Havlice, Larry Korecko, Rod Melhop, Terry Wheeler, and John Youger, Ohio Environmental Protection Agency, provided invaluable lake documentation and counsel during the Survey, reviewed the preliminary reports, and provided critiques most useful in the preparation of this Working Paper series.

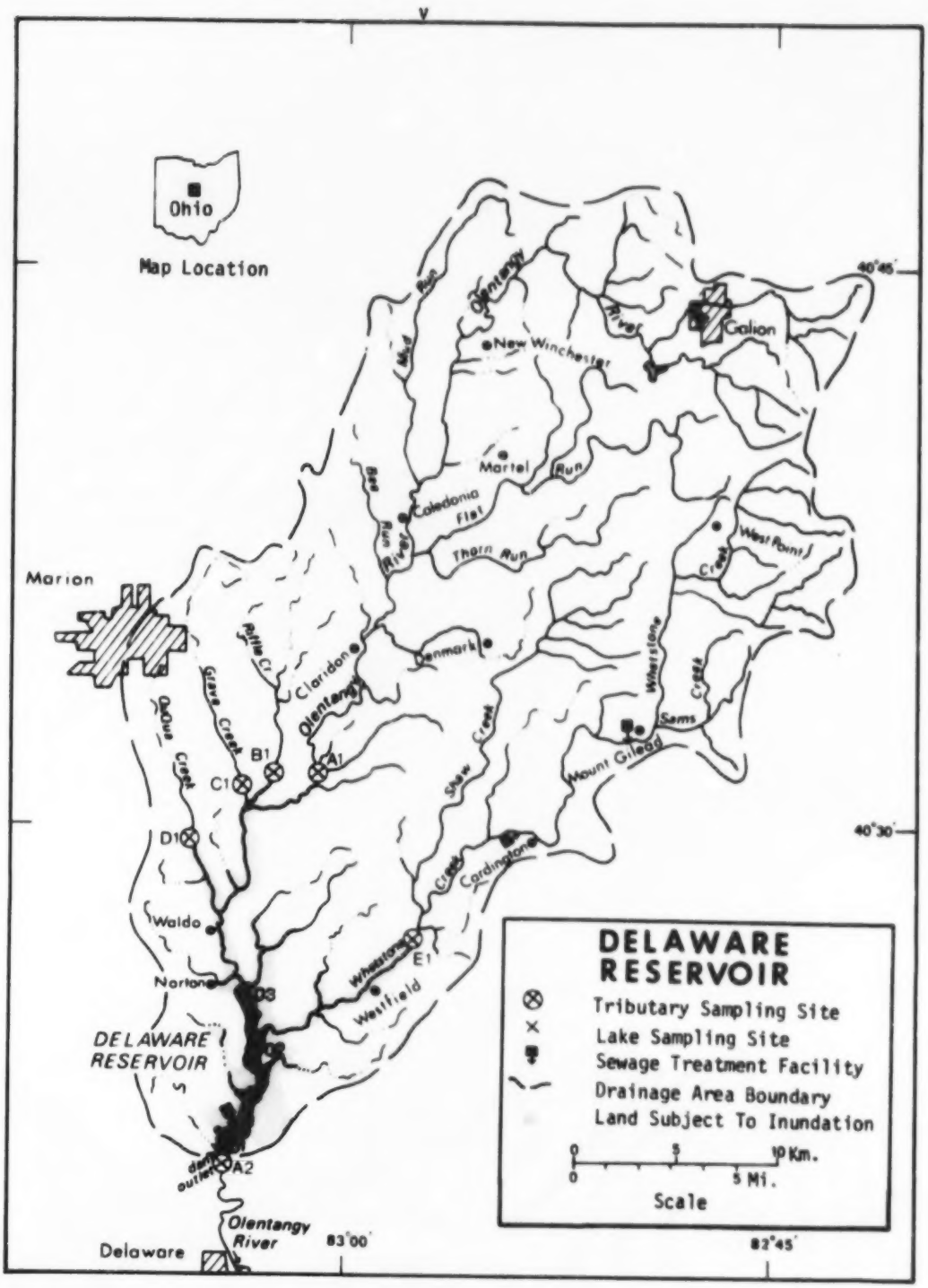
Major General Dana L. Stewart, then the Adjutant General of Ohio, and Project Officer Lt. Colonel Robert C. Timmons, who directed the volunteer efforts of the Ohio National Guardsmen, are also gratefully acknowledged for their assistance to the Survey.

NATIONAL EUTROPHICATION SURVEY

STUDY LAKES

STATE OF OHIO

LAKE NAME	COUNTY
Atwood	Carroll, Tuscarawas
Beach City	Stark, Tuscarawas
Berlin	Mahoning, Portage, Stark
Buckeye	Fairfield, Licking, Perry
Charles Mill	Ashland, Richland
Deer Creek	Fayette, Pickaway
Delaware	Delaware
Dillon	Muskingum
Grand Lake of St. Marys	Auglaize, Mercer
Grant	Brown
Holiday	Huron
Hoover	Delaware, Franklin
Indian	Logan
Loramie	Auglaize, Shelby
Mosquito Creek	Trumbull
O'Shaughnessy	Delaware
Pymatuning	Ashtabula, OH; Crawford, PA
Pleasant Hill	Ashland, Richland
Rocky Fork	Highland
Shawnee	Greene
Tappan	Harrison


Ohio
Map Location
Marion
Delaware
DELAWARE RESERVOIR
Olentangy River
Mud Run
New Winchester
Galion
Martel
Caledonia
Flat
Thorn Run
Claridon
Denmark
Sams
Mount Gilead
Cardington
Waldo
Norton
Westfield
Whetstone
Scioto
Creek
Grave Creek
Battle Cr.
Big Run
Wyandot
West Point
Creek
B1
C1
D1
A1
A2
E1
D3
40°45'
40°30'
83°00'
82°45'
DELAWARE RESERVOIR
Tributary Sampling Site
Lake Sampling Site
Sewage Treatment Facility
Drainage Area Boundary
Land Subject To Inundation
0 5 10 Km.
0 5 Mi.
Scale

DELAWARE RESERVOIR

STORET NO. 3907

I. CONCLUSIONS

A. Trophic Condition:

Survey data indicate that Delaware Reservoir is eutrophic It ranked 12th in overall trophic quality when the 20 Ohio lakes sampled in 1973 were compared using a combination of six parameters*. Eight lakes had less median total phosphorus, 15 had less median dissolved phosphorus, 16 had less median inorganic nitrogen, 13 had greater mean Secchi disc transparency, but only two had less mean chlorophyll a. Marked depression of dissolved oxygen with depth occurred at station 1 in August and October.

B. Rate-Limiting Nutrient:

The algal assay results indicate that the reservoir was limited by phosphorus at the time the sample was taken (04/26/73). The lake data indicate phosphorus limitation at the other sampling times as well.

C. Nutrient controllability:

1. Point sources--During the sampling year, the phosphorus contribution from point sources, other than septic tanks, amounted to 21.1% of the total load to Delaware Reservoir. The Galion wastewater treatment plant was the most significant point source and accounted for 15.6% of the total phosphorus load. The remaining

* See Appendix A.

point sources contributed just over 5%.

The present phosphorus loading of 12.49 $g/m^2/yr$ is over nine times that proposed by Vollenweider (Vollenweider and Dillon, 1974) as a eutrophic loading (see page 12). However, the mean hydraulic retention time of Delaware Reservoir is a rather short 23 days (at normal pool level), and Vollenweider's model may not apply.

While even complete removal of phosphorus at the known point sources would only reduce the loading to 9.85 $g/m^2/yr$, in view of the questionable applicability of Vollenweider's model, it is likely that a high degree of phosphorus removal would at least reduce the incidence and severity of nuisance algal blooms in the reservoir if other sources of phosphorus also can be controlled (see below).

2. Non-point sources--During the sampling year, the phosphorus export rates of Grave and QuQua creeks were markedly higher than the export rates of the other streams in the reservoir drainage (see page 12). Because of the proximity of these two streams to the City of Marion, it is likely urban drainage caused the higher export rates.

In all, non-point sources, excluding precipitation, are estimated to have contributed 78.6% of the total phosphorus load to the reservoir during the sampling year.

II. LAKE AND DRAINAGE BASIN CHARACTERISTICS†

A. Lake Morphometry††:

1. Surface area: 5.26 kilometers^2.
2. Mean depth: 3.3 meters.
3. Maximum depth: 9.4 meters.
4. Volume: 17.269 x 10^6 m^3.
5. Mean hydraulic retention time: 23 days (based on outflow).

B. Tributary and Outlet:
(See Appendix C for flow data)

1. Tributaries -

Name	Drainage area (km^2)*	Mean flow (m^3/sec)*
Olentangy River	468.8	4.7
Riffle Creek	45.1	0.4
Grave Creek	29.3	0.3
QuQua Creek	31.1	0.3
Whetstone Creek	255.6	2.5
Minor tributaries & immediate drainage -	164.6	1.6
Totals	994.4**	9.8

2. Outlet -

Olentangy River	999.7**	8.7

C. Precipitation***:

1. Year of sampling: 112.6 centimeters.
2. Mean annual: 92.5 centimeters.

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† Table of metric equivalents--Appendix B.
†† At normal pool level; Younger, 1975.
* For limits of accuracy, see Working Paper No. 175, "...Survey Methods, 1973-1976".
** Includes area of lake.
*** See Working Paper No. 175.

III. LAKE WATER QUALITY SUMMARY

Delaware Reservoir was sampled three times during the open-water season of 1973 by means of a pontoon-equipped Huey helicopter. Each time, samples for physical and chemical parameters were collected from three stations on the lake and from one or more depths at each station (see map, page v). During each visit, a single depth-integrated (4.6 m or near bottom to surface) sample was composited from the stations for phytoplankton identification and enumeration; and during the first visit, a single 18.9-liter depth-integrated sample was composited for algal assays. Also each time, a depth-integrated sample was collected from each of the stations for chlorophyll a analysis. The maximum depths sampled were 8.2 meters at station 1 and 2.1 meters at station 2; only near-surface samples were taken at station 3.

The sampling results are presented in full in Appendix D and are summarized in the following table.

A. SUMMARY OF PHYSICAL AND CHEMICAL CHARACTERISTICS FOR DELAWARE RESERVOIR
STORET CODE 3907

PARAMETER	1ST SAMPLING (4/26/73) 3 SITES RANGE	MEAN	MEDIAN	2ND SAMPLING (8/ 1/73) 3 SITES RANGE	MEAN	MEDIAN	3RD SAMPLING (10/10/73) 3 SITES RANGE	MEAN	MEDIAN
TEMP (C)	14.2 - 15.0	14.6	14.6	23.8 - 25.3	24.6	24.7	19.2 - 20.3	19.6	19.5
DISS OXY (MG/L)	9.2 - 10.5	10.1	10.2	0.5 - 7.1	4.5	5.8	2.2 - 8.2	5.9	6.4
CNDCTV' (MCROMO)	470. - 600.	503.	470.	469. - 511.	484.	475.	427. - 518.	458.	448.
PH (STAND UNITS)	8.1 - 8.2	8.1	8.1	7.6 - 8.2	7.9	8.0	7.6 - 8.5	8.0	8.0
TOT ALK (MG/L)	138. - 202.	155.	141.	147. - 162.	152.	151.	142. - 161.	151.	152.
TOT P (MG/L)	0.075 - 0.147	0.095	0.082	0.056 - 0.157	0.096	0.087	0.074 - 0.178	0.106	0.092
ORTHO P (MG/L)	0.020 - 0.066	0.029	0.021	0.023 - 0.064	0.035	0.029	0.018 - 0.025	0.022	0.022
NO2+NO3 (MG/L)	1.900 - 2.380	2.183	2.300	2.680 - 3.180	2.944	2.900	0.750 - 1.250	0.983	0.925
AMMONIA (MG/L)	0.040 - 0.070	0.052	0.050	0.080 - 0.180	0.139	0.150	0.050 - 0.250	0.107	0.085
KJEL N (MG/L)	0.500 - 1.000	0.783	0.800	0.900 - 1.400	1.086	1.000	0.800 - 1.900	1.067	0.950
INORG N (MG/L)	1.970 - 2.360	2.235	2.340	2.850 - 3.330	3.083	3.080	0.840 - 1.320	1.090	1.085
TOTAL N (MG/L)	2.800 - 3.100	2.967	2.950	3.780 - 4.580	4.030	4.000	1.770 - 2.650	2.050	1.975
CHLRPYL A (UG/L)	9.6 - 16.8	13.8	14.9	4.1 - 15.6	8.7	6.4	4.7 - 14.6	10.1	11.0
SECCHI (METERS)	0.3 - 0.6	0.4	0.3	0.2 - 0.5	0.3	0.4	0.4 - 0.5	0.5	0.5

B. Biological characteristics:

1. Phytoplankton -

Sampling Date	Dominant Genera	Algal Units per ml
04/26/73	1. Flagellates	4,305
	2. Cryptomonas sp.	1,897
	3. Centric diatoms	1,109
	4. Coccoid cells	773
	5. Synedra sp.	379
	Other genera	585
	Total	9,048
08/01/73	1. Cyclotella sp.	415
	2. Euglena sp.	236
	3. Melosira sp.	139
	4. Flagellates	99
	5. Gymnodinium sp.	20
	Other genera	170
	Total	1,079
10/10/73	1. Stephanodiscus sp.	819
	2. Melosira sp.	109
	3. Flagellates	82
	4. Gymnodinium sp.	55
	5. Trachelomonas sp.	55
	Other genera	300
	Total	1,420

2. Chlorophyll a -

Sampling Date	Station Number	Chlorophyll a (µg/l)
04/26/73	01	14.9
	02	16.8
	03	9.6
08/01/73	01	4.1
	02	6.4
	03	15.6
10/10/73	01	4.7
	02	11.0
	03	14.6

C. Limiting Nutrient Study:

1. Autoclaved, filtered, and nutrient spiked -

Spike (mg/l)	Ortho P Conc. (mg/l)	Inorganic N Conc. (mg/l)	Maximum yield (mg/l-dry wt.)
Control	0.016	0.438	0.8
0.050 P	0.066	0.438	18.5
0.050 P + 1.0 N	0.066	1.438	18.2
1.0 N	0.016	1.438	1.8

2. Discussion -

The control yield of the assay alga, Selenastrum capricornutum, indicates that the potential primary productivity of Delaware Reservoir was moderate at the time the sample was collected (04/26/73). The yield increased substantially with the addition of phosphorus alone but not with the addition of nitrogen alone. This indicates phosphorus was the limiting nutrient.

The lake data indicate phosphorus limitation at all sampling times; the mean ratios of inorganic nitrogen/orthophosphorus were 77/1, 88/1, and 50/1 in April, August, and October, respectively, and phosphorus limitation would be expected.

IV. NUTRIENT LOADINGS
(See Appendix E for data)

For the determination of nutrient loadings, the Ohio National Guard collected monthly near-surface grab samples from each of the tributary sites indicated on the map (page v), except for the high runoff months of February and March when two samples were collected. Sampling was begun in May, 1973, and was completed in April, 1974.

Through an interagency agreement, stream flow estimates for the year of sampling and a "normalized" or average year were provided by the Ohio District Office of the U.S. Geological Survey for the tributary sites nearest the lake.

In this report, nutrient loads for sampled tributaries were determined by using a modification of a U.S. Geological Survey computer program for calculating stream loadings*. Nutrient loads shown are those measured minus point-source loads, if any.

Nutrient loads for unsampled "minor tributaries and immediate drainage" ("ZZ" of U.S.G.S.) were estimated using the nutrient loads, in $kg/km^2/year$, at station B-1 and multiplying by the ZZ area in km^2.

The operators of the Galion and Mt. Gilead wastewater treatment plants provided monthly effluent samples and corresponding flow data The operator of the Delaware State Park plant did not participate in the Survey, and nutrient loads were estimated at 1.134 kg P and 3.401 N/capita/year.

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* See Working Paper No. 175.

Nutrient loadings for the Village of Cardington were estimated at 1.587 kg P and 4.263 kg N/capita/year for 30% of the population during the months of May through September and 1.134 kg P and 3.401 kg N/capita/year for the total population during the months of October through April (from May through September, 1973, approximately 30% of the population served discharged untreated sewage to Whetstone Creek; Gompf, 1975).

A. Waste Sources:

1. Known municipal* -

Name	Pop. Served	Treatment	Mean Flow (m^3/d)	Receiving Water
Caledonia	792	septic tanks	299.8**	Olentangy River
Galion	14,000	act. sludge	6,042.1	Olentangy River
Mt. Gilead	3,500	act. sludge	1,741.6	Whetstone Creek
Cardington	1,780	act. sludge	673.7**	Whetstone Creek
Delaware State Park	75	act. sludge	28.4**	Delaware Reservoir

2. Known industrial - None

* Treatment plant questionnaires.
** Estimated at 0.3785 m^3/capita/day.

B. Annual Total Phosphorus Loading - Average Year:

1. Inputs -

Source	kg P/ yr	% of total
a. Tributaries (non-point load) -		
Olentangy River	26,485	40.3
Riffle Creek	1,840	2.8
Grave Creek	3,780	5.8
QuQua Creek	3,195	4.9
Whetstone Creek	9,565	14.6
b. Minor tributaries & immediate drainage (non-point load) -	6,750	10.3
c. Known municipal STP's -		
Galion	10,260	15.6
Mt. Gilead	1,975	3.0
Cardington	1,530	2.3
Delaware State Park	85	0.1
d. Septic tanks* -	120	0.2
e. Known industrial - None	-	-
f. Direct precipitation** -	90	0.1
Total	65,675	100.0

2. Outputs -

Lake outlet - Olentangy River 38,245

3. Net annual P accumulation - 27,430 kg.

* Estimate based on septic tanks at Caledonia and 105 lakeshore dwellings; see Working Paper No. 175.
** See Working Paper No. 175.

C. Annual Total Nitrogen Loading - Average Year:

1. Inputs -

Source	kg N/ yr	% of total
a. Tributaries (non-point load) -		
Olentangy River	553,075	46.9
Riffle Creek	66,560	5.6
Grave Creek	32,340	2.7
QuQua Creek	35,030	3.0
Whetstone Creek	190,155	16.1
b. Minor tributaries & immediate drainage (non-point load) -	242,950	20.6
c. Known municipal STP's -		
Galion	36,740	3.1
Mt. Gilead	7,685	0.7
Cardington	4,480	0.4
Delaware State Park	255	<0.1
d. Septic tanks* -	4,495	0.4
e. Known industrial - None	-	-
f. Direct precipitation** -	5,680	0.5
Total	1,179,445	100.0

2. Outputs -

Lake outlet - Olentangy River 1,054,250

3. Net annual N accumulation - 125,195 kg.

* Estimate based on septic tanks at Caledonia and 105 lakeshore dwellings; see Working Paper No. 175.
** See Working Paper No. 175.

D. Mean Annual Non-point Nutrient Export by Subdrainage Area:

Tributary	kg P/km²/yr	kg N/km²/yr
Olentangy River	56	1,180
Riffle Creek	41	1,476
Grave Creek	129	1,104
QuQua Creek	103	1,126
Whetstone Creek	37	744

E. Yearly Loadings:

In the following table, the existing phosphorus loadings are compared to those proposed by Vollenweider (Vollenweider and Dillon, 1974). Essentially, his "dangerous" loading is the rate at which the receiving water would become eutrophic or remain eutrophic; his "permissible" loading is that which would result in the receiving water remaining oligotrophic or becoming oligotrophic if morphometry permitted. A mesotrophic loading would be considered one between "dangerous" and "permissible".

Note that Vollenweider's model may not be applicable to water bodies with short hydraulic retention times.

	Total Phosphorus		Total Nitrogen	
	Total	Accumulated	Total	Accumulated
grams/m²/yr	12.49	5.21	224.2	23.8

Vollenweider phosphorus loadings (g/m²/yr) based on mean depth and mean hydraulic retention time of Delaware Reservoir:

"Dangerous" (eutrophic loading)	1.36
"Permissible" (oligotrophic loading)	0.68

V. LITERATURE REVIEWED

Gompf, Gene, 1975. Personal communication (Cardington wastewater treatment facilities). Cardington, OH.

Vollenweider, R. A., and P. J. Dillon, 1974. The application of the phosphorus loading concept to eutrophication research. Natl. Res. Council of Canada Publ. No. 13690, Canada Centre for Inland Waters, Burlington, Ontario.

Youger, John, 1975. Personal communication (lake morphometry). OH Env. Prot. Agency, Columbus.

VI. APPENDICES

APPENDIX A

LAKE RANKINGS

LAKES RANKED BY INDEX NOS.

RANK	LAKE CODE	LAKE NAME	INDEX NO
1	3926	ATWOOD RESERVOIR	491
2	3921	MOSQUITO CREEK RESERVOIR	483
3	3924	PLEASANT HILL LAKE	431
4	3929	BERLIN RESERVOIR	429
5	3914	HOOVER RESERVOIR	392
6	3934	TAPPAN LAKE	381
7	3927	LAKE SAINT MARYS	297
8	3932	ROCKY FORK LAKE	292
9	3906	DEER CREEK RESERVOIR	290
10	3901	BEACH CITY RESERVOIR	277
11	3915	INDIAN LAKE	266
12	3907	DELAWARE RESERVOIR	263
13	3912	GRANT LAKE	261
14	3933	SHAWNEE LAKE	249
15	3930	HOLIDAY LAKE	220
16	3905	CHARLES MILL RESERVOIR	216
17	3902	BUCKEYE LAKE	207
18	3908	DILLION RESERVOIR	206
19	3917	LORAMIE LAKE	178
20	3931	O'SHAUGNESSY RESERVOIR	173

PERCENT OF LAKES WITH HIGHER VALUES (NUMBER OF LAKES WITH HIGHER VALUES)

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS ORTHO P	INDEX NO
3901	BEACH CITY RESERVOIR	37 (7)	21 (4)	11 (2)	84 (16)	82 (15)	42 (8)	277
3902	BUCKEYE LAKE	11 (2)	76 (14)	5 (1)	0 (0)	89 (17)	26 (5)	207
3905	CHARLES MILL RESERVOIR	26 (5)	63 (12)	37 (7)	21 (4)	11 (0)	58 (11)	216
3906	DEER CREEK RESERVOIR	53 (10)	5 (1)	63 (12)	95 (18)	63 (12)	11 (2)	290
3907	DELAWARE RESERVOIR	58 (11)	16 (3)	32 (6)	89 (17)	47 (9)	21 (4)	263
3908	DILLION RESERVOIR	16 (3)	32 (6)	42 (8)	58 (11)	53 (10)	5 (1)	206
3912	GRANT LAKE	47 (9)	58 (11)	16 (3)	32 (6)	74 (14)	34 (6)	261
3914	HOOVER RESERVOIR	87 (16)	26 (5)	89 (17)	79 (15)	32 (6)	79 (15)	392
3915	INDIAN LAKE	42 (8)	76 (14)	21 (4)	16 (3)	58 (11)	53 (10)	266
3917	LORAMIE LAKE	5 (1)	37 (7)	0 (0)	5 (1)	97 (18)	34 (6)	178
3921	MOSQUITO CREEK RESERVOIR	74 (14)	100 (19)	82 (15)	53 (10)	82 (15)	92 (17)	483
3924	PLEASANT HILL LAKE	95 (18)	68 (13)	100 (19)	63 (12)	39 (7)	66 (12)	431
3927	LAKE SAINT MARYS	21 (4)	95 (18)	26 (5)	11 (2)	97 (18)	47 (9)	297
3928	ATWOOD RESERVOIR	100 (19)	89 (17)	95 (18)	68 (13)	39 (7)	100 (19)	491
3929	BERLIN RESERVOIR	79 (15)	42 (8)	74 (14)	74 (14)	68 (13)	92 (17)	429
3930	HOLIDAY LAKE	32 (6)	53 (10)	82 (15)	26 (5)	11 (0)	16 (3)	220
3931	O'SHAUGNESSY RESERVOIR	0 (0)	0 (0)	47 (9)	100 (19)	26 (5)	0 (0)	173
3932	ROCKY FORK LAKE	68 (13)	47 (9)	58 (11)	42 (8)	11 (0)	66 (12)	292
3933	SHAWNEE LAKE	63 (12)	11 (2)	53 (10)	37 (7)	11 (0)	74 (14)	249
3934	TAPPAN LAKE	87 (16)	84 (16)	68 (13)	47 (9)	11 (0)	84 (16)	381

LAKE DATA TO BE USED IN RANKINGS

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS ORTHO P
3901	BEACH CITY RESERVOIR	0.122	1.490	489.000	10.867	11.600	0.015
3902	BUCKEYE LAKE	0.179	0.380	490.000	186.567	9.600	0.020
3905	CHARLES MILL RESERVOIR	0.127	0.465	482.555	67.144	15.000	0.011
3906	DEER CREEK RESERVOIR	0.098	2.980	470.125	9.887	13.900	0.036
3907	DELAWARE RESERVOIR	0.086	2.340	484.111	10.856	14.500	0.024
3908	DILLION RESERVOIR	0.163	1.590	481.250	27.400	14.300	0.037
3912	GRANT LAKE	0.113	0.570	486.333	40.533	12.200	0.019
3914	HOOVER RESERVOIR	0.040	1.640	462.750	13.017	14.800	0.008
3915	INDIAN LAKE	0.120	0.380	485.222	76.855	14.200	0.012
3917	LORAMIE LAKE	0.185	1.380	494.000	104.100	8.200	0.019
3921	MOSQUITO CREEK RESERVOIR	0.058	0.150	465.333	36.267	11.600	0.006
3924	PLEASANT HILL LAKE	0.036	0.455	456.833	22.850	14.700	0.010
3927	LAKE SAINT MARYS	0.148	0.200	484.167	79.150	8.200	0.014
3928	ATWOOD RESERVOIR	0.031	0.205	462.000	16.442	14.700	0.005
3929	BERLIN RESERVOIR	0.042	0.400	465.435	15.496	13.600	0.006
3930	HOLIDAY LAKE	0.125	0.575	465.333	55.350	15.000	0.034
3931	O'SHAUGNESSY RESERVOIR	0.204	3.070	479.333	5.522	14.900	0.159
3932	ROCKY FORK LAKE	0.067	0.790	473.000	38.022	15.000	0.010
3933	SHAWNEE LAKE	0.069	2.380	474.333	39.567	15.000	0.009
3934	TAPPAN LAKE	0.040	0.280	466.111	37.711	15.000	0.007

APPENDIX B

CONVERSIONS FACTORS

CONVERSION FACTORS

Hectares x 2.471 = acres

Kilometers x 0.6214 = miles

Meters x 3.281 = feet

Cubic meters x 8.107×10^{-4} = acre/feet

Square kilometers x 0.3861 = square miles

Cubic meters/sec x 35.315 = cubic feet/sec

Centimeters x 0.3937 = inches

Kilograms x 2.205 = pounds

Kilograms/square kilometer x 5.711 = lbs/square mile

APPENDIX C

TRIBUTARY FLOW DATA

TRIBUTARY FLOW INFORMATION FOR OHIO 7/18/75

LAKE CODE 3907 DELAWARE RESERVOIR

TOTAL DRAINAGE AREA OF LAKE(SQ KM) 999.7

TRIBUTARY	SUB-DRAINAGE AREA(SQ KM)	NORMALIZED FLOWS(CMS) JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN
3907A1	468.8	9.37	9.00	11.50	9.12	4.90	3.54	1.53	0.85	0.57	0.34	1.76	4.11	4.69
3907A2	999.7	11.10	17.30	22.09	13.68	12.20	6.85	4.30	2.32	1.25	1.08	4.05	8.38	8.67
3907B1	45.1	0.62	0.74	1.13	0.91	0.54	0.28	0.19	0.09	0.06	0.08	0.16	0.37	0.43
3907C1	29.3	0.40	0.48	0.74	0.59	0.34	0.19	0.12	0.05	0.04	0.05	0.10	0.23	0.28
3907D1	31.1	0.42	0.51	0.79	0.62	0.37	0.20	0.13	0.05	0.04	0.05	0.11	0.23	0.29
3907E1	255.6	3.48	4.56	7.22	4.93	2.52	1.98	1.02	0.51	0.42	0.31	1.16	1.95	2.49
3907ZZ	169.9	2.35	2.72	4.05	3.26	1.93	1.16	0.71	0.34	0.26	0.34	0.65	1.33	1.58

SUMMARY

TOTAL DRAINAGE AREA OF LAKE = 999.7
SUM OF SUB-DRAINAGE AREAS = 999.7

TOTAL FLOW IN = 117.79
TOTAL FLOW OUT = 104.60

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
3907A1	5	73	6.40	5	3.06				
	6	73	8.10	9	7.39				
	7	73	4.42	12	4.70				
	8	73	1.36	14	1.47				
	9	73	0.26	15	0.22				
	10	73	0.48	20	0.23				
	11	73	3.79	10	0.42				
	12	73	7.05	7	4.02				
	1	74	18.09	9	1.64				
	2	74	5.10	9	3.71	23	15.77		
	3	74	9.74	9	6.85	23	3.99		
	4	74	7.42	6	15.40				
3907A2	5	73	12.46	5	8.66				
	6	73	16.93	9	26.53				
	7	73	8.50	12	6.57				
	8	73	6.63	14	15.63				
	9	73	0.74	15	0.74				
	10	73	1.39	20	0.62				
	11	73	9.47	10	1.27				
	12	73	21.64	7	17.61				
	1	74	37.94	9	5.49				
	2	74	12.71	9	12.37	23	31.15		
	3	74	19.03	9	18.15	23	6.63		
	4	74	14.30	6	33.41				

TRIBUTARY FLOW INFORMATION FOR OHIO 7/18/75

LAKE CODE 3907 DELAWARE RESERVOIR

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
3907B1	5	73	0.48	5	0.37				
	6	73	0.91	9	0.65				
	7	73	0.40	12	0.26				
	8	73	0.51	14	0.96				
	9	73	0.03	15	0.01				
	10	73	0.15	20	0.01				
	11	73	0.62	10	0.08				
	12	73	1.05	7	0.65				
	1	74	1.59	9	0.40				
	2	74	0.74	9	0.42	23	1.50		
	3	74	0.91	9	0.45	23	0.62		
	4	74	0.79	6	1.27				
3907C1	5	73	0.31	5	0.24				
	6	73	0.59	9	0.42				
	7	73	0.25	12	0.17				
	8	73	0.28	14	0.62				
	9	73	0.02	15	0.03				
	10	73	0.09	20	0.03				
	11	73	0.40	10	0.05				
	12	73	0.65	7	0.42				
	1	74	1.02	9	0.27				
	2	74	0.48	9	0.27	23	0.96		
	3	74	0.59	9	0.28	23	0.40		
	4	74	0.51	6	0.82				
3907D1	5	73	0.34	5	0.25				
	6	73	0.65	9	0.45				
	7	73	0.27	12	0.18				
	8	73	0.28	14	0.68				
	9	73	0.02	15	0.0				
	10	73	0.10	20	0.00				
	11	73	0.40	10	0.05				
	12	73	0.65	7	0.45				
	1	74	1.10	9	0.28				
	2	74	0.51	9	0.28	23	1.02		
	3	74	0.62	9	0.31	23	0.42		
	4	74	0.54	6	0.88				
3907E1	5	73	3.31	5	2.46				
	6	73	3.34	9	1.87				
	7	73	1.87	12	2.69				
	8	73	2.12	14	4.12				
	9	73	0.21	15	0.18				
	10	73	0.54	20	0.28				
	11	73	2.94	10	0.42				
	12	73	4.53	7	2.52				
	1	74	10.11	9	1.50				
	2	74	3.26	9	2.97	23	7.42		
	3	74	5.41	9	4.33	23	2.35		
	4	74	3.14	6	4.30				

TRIBUTARY FLOW INFORMATION FOR OHIO 7/18/75

LAKE CODE 3907 DELAWARE RESERVOIR

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
390727	5	73	1.76						
	6	73	3.68						
	7	73	1.47						
	8	73	1.93						
	9	73	3.12						
	10	73	0.62						
	11	73	2.40						
	12	73	3.77						
	1	74	5.63						
	2	74	2.75						
	3	74	3.26						
	4	74	2.83						

APPENDIX D

PHYSICAL and CHEMICAL DATA

STORET RETRIEVAL DATE 73/01/27

390701
40 21 38.0 083 04 08.0
DELAWARE RESERVOIR
39041 OHIO

11EPALES 2111202
3 0029 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/04/26	10	30 0000	15.0		24	470	8.20	138	0.060	0.800	2.300	0.020
	10	30 0006	14.9	10.5		470	8.20	140	0.040	0.800	2.300	0.022
	10	30 0016	14.7	10.2		470	8.20	141	0.040	0.700	2.300	0.020
	10	30 0025	14.2	10.1		470	8.10	141	0.050	0.500	2.300	0.020
73/08/01	14	30 0000	24.7		18	469	8.20	147	0.080	1.200	2.800	0.023
	14	30 0005	24.6	5.8		469	8.00	147	0.130	1.000	3.070	0.028
	14	30 0015	24.4	3.3		470	7.70	148	0.110	1.000	3.080	0.029
	14	30 0027	23.8	0.5		475	7.60	154	0.170	1.100	2.680	0.027
73/10/10	14	35 0000	19.4	6.0	19	429	8.10	147	0.050	0.800	1.180	0.025
	14	35 0011	19.3			427						
	14	35 0015	19.3	5.4		434	7.80	148	0.070	0.800	1.250	0.023
	14	35 0027	19.2	2.2		461	7.60	155	0.250	0.900	0.870	0.024

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/04/26	10	30 0000	0.081	14.9
	10	30 0006	0.084	
	10	30 0016	0.075	
	10	30 0025	0.081	
73/08/01	14	30 0000	0.067	4.1
	14	30 0005	0.056	
	14	30 0015	0.078	
	14	30 0027	0.130	
73/10/10	14	35 0000	0.076	4.7
	14	35 0015	0.099	
	14	35 0027	0.178	

STORET RETRIEVAL DATE 75/01/27

390702
40 24 01.0 083 03 10.0
DELAWARE RESERVOIR
39041 OHIO

11EPALES
3

2111202
0005 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/04/26	11 00	0000	14.6	9.2	12	540	8.10	168	0.070	1.000	1.900	0.026
73/08/01	15 05	0000	25.3		16	496	8.00	154	0.150	0.900	2.900	0.040
	15 05	0005	25.0	5.9		496	8.00	151	0.180	1.000	2.900	0.037
73/10/10	14 15	0000	20.3	7.0	19	467	8.10	155	0.080	1.000	0.970	0.018
	14 15	0004	19.8	6.8		493	8.00	161	0.100	1.000	0.880	0.022
	14 15	0007	19.6			518						

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/04/26	11 00	0000	0.105	16.8
73/08/01	15 05	0000	0.096	6.4
	15 05	0005	0.087	
73/10/10	14 15	0000	0.074	11.0
	14 15	0004	0.125	

STORET RETRIEVAL DATE 75/01/27

390703
40 25 44.0 083 04 32.0
DELAWARE RESERVOIR
39041 OHIO

11EPALES
3

2111202
0004 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/04/26	11 20 0000		14.5	10.3	12	600	8.10	202	0.050	0.900	2.000	0.066
73/08/01	15 20 0000		24.7	7.1	7	511	8.10	162	0.150	1.400	3.180	0.064
73/10/10	14 00 0000		19.7	8.2	16	431	8.50	142	0.090	1.900	0.750	0.021

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/04/26	11 20 0000		0.147	9.6
73/08/01	15 20 0000		0.157	15.6
73/10/10	14 00 0000		0.086	14.6

APPENDIX E

TRIBUTARY and WASTEWATER TREATMENT PLANT DATA

STORET RETRIEVAL DATE 75/02/03

39047A1
40 31 40.0 083 00 48.0
OLENTANGY RIVER
39047 7.5 MARION EAST
1/DELAWARE RESERVOIR
BRDG # OF FIRSTENBERGR-EAST RIVER RD JCT
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/05/05	16 05		1.860	0.800	0.013	0.068	0.105
73/06/09	09 00		3.300	1.600	0.063	0.100	0.260
73/07/12	08 45		2.760	2.600	0.170	0.080	0.330
73/08/14	14 45		1.440	1.600	0.067	0.099	0.210
73/09/15	09 30		0.231	1.380	0.069	0.097	0.230
73/10/20	13 50		0.350	0.900	0.014	0.132	0.230
73/11/10	09 30		2.000	0.450	0.032	0.176	0.240
73/12/07	11 40		3.080	1.500	0.208	0.176	0.280
74/01/09	10 20		2.800	0.750	0.240	0.088	0.163
74/02/09	09 45		2.520	1.000	0.300	0.165	0.230
74/02/23	09 50		4.400	1.900	0.095	0.100	0.315
74/03/09	09 33		2.940	1.000	0.050	0.075	0.210
74/03/23	09 20		2.400	0.800	0.080	0.070	0.135
74/04/06	09 00		2.760	2.300	0.075	0.125	0.575

STORET RETRIEVAL DATE 75/02/03

3907A2
40 21 15.0 083 04 05.0
DELAWARE RIVER
39 7.5 DELAWARE
D/DELAWARE RESERVOIR
BRDG BELO DAM 3 MI N OF DELAWARE
11EPALES 21112U4
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/05/05	15 10		2.020	1.200	0.077	0.038	0.090
73/06/04	08 15		2.400	2.200	0.180	0.040	0.095
73/07/12	07 35		4.000	2.000	0.058	0.075	0.175
73/08/14	14 05		1.470	0.860	0.060	0.031	0.077
73/09/15	08 50		1.160	1.800	0.147	0.021	0.115
73/10/20	13 15		1.060	0.950	0.015	0.026	0.080
73/11/10	08 55		0.930	1.300	0.016	0.020	0.060
73/12/07	10 55		4.300	1.200	0.096	0.084	0.160
74/01/04	09 30		3.700	0.900	0.096	0.060	0.115
74/02/09	09 05		2.800	1.400	0.095	0.075	0.170
74/02/23	09 05		2.300	0.800	0.110	0.070	0.155
74/03/04	09 00		2.900	0.700	0.060	0.050	0.125
74/03/23	08 45		2.700	0.800	0.085	0.070	0.155
74/04/06	08 30		3.080	1.300	0.085	0.135	0.380

STORET RETRIEVAL DATE 75/02/03

390181
40 31 40.0 075 02 25.0
KIFFLE CREEK
34 7.5 MARION EAST
T/DELAWARE RESERVOIR
FIRSTENBERGER RD BRDG NEAR ST JOHNS CHUR
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/05/05	15 55		4.100	1.900	0.060	0.031	0.080
73/06/09	08 50		6.600	1.400	0.073	0.052	0.195
73/07/12	08 40		3.300	1.260	0.210	0.046	0.150
73/08/14	14 38		1.680	2.000	0.176	0.176	0.400
73/09/15	09 20		0.870	1.150	0.075	0.061	0.240
73/10/20	13 45		0.450	1.000	0.069	0.039	0.090
73/11/10	09 20		2.400	0.900	0.072	0.044	0.085
73/12/07	11 35		4.500	0.400	0.056	0.052	0.080
74/01/09	10 15		4.700	0.500	0.060	0.036	0.065
74/02/04	09 40		4.500	0.500	0.055	0.040	0.070
74/02/23	09 40		5.300	0.900	0.045	0.045	0.140
74/03/04	09 28		5.300	0.900	0.025	0.035	0.150
74/03/23	09 15		4.300	0.500	0.035	0.030	0.055
74/04/06	08 50		4.620	0.800	0.055	0.050	0.115

STORET RETRIEVAL DATE 75/02/03

3907C1
40 31 40.0 083 03 45.0
GRAVE CREEK
39 7.5 MARION EAST
T/DELAWARE RESERVOIR
FIRSTENBERGER RD BRDG NEAR SAYLER CEMETA
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/05/05	16	20	1.800	1.200	0.130	0.176	0.300
73/06/09	08	45	3.500	2.000	0.380	0.240	0.420
73/07/12	08	30	2.200	1.680	0.550	0.260	0.460
73/08/14	14	33	1.800	2.800	0.336	0.280	0.690
73/09/15	09	15	0.940	2.000	0.950	0.710	0.880
73/10/20	13	40	2.040	1.380	0.410	0.510	0.675
73/11/10	09	18	2.000	1.280	0.560	0.480	0.645
73/12/07	11	30	2.500	1.200	0.336	0.168	0.280
74/01/09	10	05	2.300	1.000	0.460	0.284	0.430
74/02/04	09	35	2.500	0.700	0.250	0.160	0.270
74/02/23	09	35	3.000	1.100	0.145	0.115	0.230
74/03/09	09	22	2.200	1.300	0.120	0.155	0.300
74/03/23	09	10	2.000	0.800	0.165	0.175	0.280
74/04/06			2.200	1.000	0.145	0.090	0.175

STORET RETRIEVAL DATE 75/02/03

390701
40 29 55.0 083 05 20.0
00 QUA CREEK
39 7.5 WALDO
T/DELAWARE RESERVOIR
CARDINGTON RD BRDG 3 MI N OF WALDO
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/05/05	15	35	3.000	1.540	0.044	0.168	0.210
73/06/09	08	35	3.400	1.050	0.105	0.300	0.440
73/07/12	08	15	3.100	1.050	0.115	0.315	0.430
73/08/14	14	23	2.800	2.940	0.690	0.252	0.630
73/09/15	09	10	1.380	1.470	0.220	0.360	0.630
73/10/20	13	30	1.900	0.750	0.093	0.240	0.330
73/11/10	09	10	2.000	0.850	0.140	0.276	0.440
73/12/07	11	20	2.700	0.600	0.124	0.168	0.235
74/01/09	09	50	2.760	0.700	0.216	0.240	0.345
74/02/09	09	25	2.900	0.400	0.130	0.130	0.190
74/02/23	09	25	3.000	0.800	0.095	0.110	0.210
74/03/09	09	15	2.600	0.800	0.080	0.160	0.290
74/03/23	09	00	2.520	1.000	0.070	0.180	0.275
74/04/06	08	45	2.640	0.800	0.120	0.115	0.170

STORET RETRIEVAL DATE 75/02/03

3907E1
40 27 20.0 082 57 35.0
WHETSTONE RIVER
39 7.5 ASHLEY
1/DELAWARE RESERVOIR
WALDO ASHLEY RD BRD
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/05/05	16 45		0.770	0.700	0.035	0.042	0.065
73/06/09	09 15		1.760	1.600	0.088	0.080	0.200
73/07/12	09 10		2.020	1.890	0.160	0.089	0.325
73/08/14	15 40		1.360	2.310	0.340	0.094	0.387
73/09/15	09 45		0.210	1.050	0.110	0.105	0.175
73/10/20	14 05		0.220	1.150	0.084	0.126	0.180
73/11/10	09 40		0.930	0.800	0.028	0.112	0.140
73/12/07	11 55		2.000	0.900	0.060	0.052	0.120
74/01/09	10 45		1.400	0.500	0.112	0.052	0.100
74/02/09	10 00		1.680	0.400	0.087	0.035	0.065
74/02/23	10 10		2.600	1.100	0.065	0.035	0.175
74/03/09	09 47		1.760	0.800	0.045	0.045	0.183
74/03/23	09 35		1.260	0.600	0.100	0.070	0.090
74/04/06	09 20		1.500	0.950	0.075	0.035	0.125

STORET RETRIEVAL DATE 75/02/03

3907AA AS3907AA P014000
40 44 15.0 082 47 15.0
GALION WATER POLLUTION CONTROL
39047 CRAWFORD COUNTY
T/DELAWARE RESERVOIR
OLLETANGY RIVER
11EPALES 2141204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/08/15	08 00								
CP(T)-			0.140	18.900	1.360	0.860	3.900	1.780	1.820
73/08/15	18 00								
73/08/23	08 00								
CP(T)-			0.042	19.800	7.700	3.900		1.350	1.820
73/08/23	18 00								
73/09/12	10 00		0.032	26.000	10.200	5.120	6.750	1.350	1.820
73/10/03	08 00								
CP(T)-			0.050	22.000	12.600	4.400	4.700	1.280	1.260
73/10/03	18 00								
73/11/29	11 30		0.900	13.500	3.200	2.800	4.200	1.820	1.360
73/12/28	12 35		1.760	9.400	1.470	3.400	7.650	1.730	1.570
74/01/28	10 30		1.520	7.500	0.600	1.310	2.200	1.860	1.730
74/03/06	10 15		1.080	12.000	2.300	3.100	4.400	1.750	1.800
74/04/02	10 45		0.680	9.400	0.330	1.900	3.300	1.930	1.970
74/04/30	14 00		0.520	19.000	5.800	4.100	6.400	1.700	1.890
74/06/19	09 00		0.240	21.000	9.700	4.000	5.600	1.210	1.610
74/07/22	10 30		0.640	25.250	13.500	4.400	5.800	0.825	1.100
74/08/15	09 15		0.040	17.000			3.100	1.520	1.000

STORET RETRIEVAL DATE 75/02/03

3907EA AS3907EA P003500
40 33 04.0 082 51 39.0
MOUNT GILEAD CITY
39 MORROW COUNTY
T/DELAWARE RESERVOIR
WHETSTONE RIVER
11EPALES 2141204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/10/31	14 15		0.020	18.000	4.000	4.500	5.600	0.389	0.300
73/11/30	10 00		1.100	9.000	0.063	1.400	1.800	0.623	0.361
73/12/21	10 00		1.890	6.650	0.080	1.050	1.300	0.827	0.420
74/01/23	10 30		1.360	4.600	0.067	0.680	1.400	1.000	0.525
74/02/22	10 30		0.440	7.200	0.670	1.360	1.700	0.728	0.502
74/03/20	10 00		0.320	9.600	0.190	2.400	3.150	0.554	0.627
74/04/24	10 00		0.117	12.000	2.200	2.450	3.800	0.400	0.600
74/05/24	14 00		0.040	17.000	1.600	3.300	4.400	0.415	0.573
74/06/21	10 30		0.080	27.000	9.000	2.573	7.900	0.336	0.353
74/08/21	09 30		0.040	23.000	4.400	5.000	6.650	0.434	0.350
74/09/18	10 30		0.040	13.000	1.650	2.200	3.200	0.562	0.450